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ABSTRACT

Intended to stimulate discussion by Montana state leaders, this paper examines critical issues raised by the application of new technologies in public education in terms of the challenges they present to the Montana educational system. A statement of each issue is followed by a discussion of its implications. The issues examined relate to the following topics: (1) application of information technology as it affects teachers' roles and preparation; (2) teacher preparation and reeducation to utilize new technology; (3) preparation of faculty, administration, and staff in teacher training institutions to use new technologies and to apply them in teacher training; (4) recruitment of teacher education students; (5) the status of teacher education within the university system structure and leadership in preparing education personnel; (6) recognition of the place of education and its institutions in preparing knowledge workers; (7) the human needs of individuals; (8) cooperative efforts to provide structure, coordination, and resources for a future-oriented education program; (9) access to information technologies for all students and for preservice and inservice teachers, particularly in rural areas; and (10) national and regional reciprocity of education. (LMM)

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A Critical Issues Paper

Information Technology:

Its Impact On and Implications For Education in Montana

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Introduction

Within the past several months many state leaders have been confronted with a dazzling preview of information technologies along with discussions about their impact on the social, political, economic and educational fabric of our state.

Although none of us, as yet, have a full understanding of the implications and impact of these technologies, it is imperative that we make some decisions about how we are going to plan for their utilization in our state's education programs.

The intelligent application of technology in our public schools and teacher education programs is in the best interest of all segments of our society and will require a commitment from the business community, politicians, educators and the larger society.

While most discussion and descriptions of information technologies focus on the micro-computer, it is quite likely that we will see dramatic educational changes through applications of other similar telecommunication systems, i.e., television, cable television, public television, public radio, videotex, teleconferencing, telecourses, computer assisted instruction (CAI), computer managed instruction (CMI), video disc, teletext, word processors, etc. Currently available are means of storing and transmitting data banks through extensive use of satellite transmission linked to microcomputers, cable television and low power transmittors. All of the above information processors and retrieval systems are with us today and will greatly change our education programs in Montana.

It is abundantly clear that the role of public education

in our state and nation must shift dramatically from one in which youth are taught basic skills to prepare for entry into the labor market to a system in which all citizens are educated broadly for life, work and full participation in the information oriented society of the future.

Background

Today nearly 60% of our society is engaged in the production of information goods and services and that figure is still climbing: only about 17% of the work force was so engaged in 1950. We have moved from being farmers, to production laborers to information processors in less than five decades. The transformation from an industrial society to an information society will be complete in the next few years and will be as far reaching in its consequences as the industrial revolution. This change has enormous implications for us as a society and as individuals. The implications of this transformation for educational systems are only now becoming apparent. The application of these technologies raise critical issues that must be addressed if we are to provide Montana's citizens an education for the twenty first century.

The Premise

The premise of this paper is that certain critical issues must receive immediate attention if we in Montana are not to be caught with an educational system unable to meet the challenges that confront us. Most experts are talking about a three to five year "window of opportunity" for education to deal with the realities of the new information technologies. If we do not make significant strides within that time frame, we may be destined to

the role of a second rate information producing and utilizing state and society.

The challenge to our educational institutions was stated succinctly by Shirley McCune, of the Education Commission of the States, in the following three premises. "The future of our economic system and the defense of our nation are being written in todays' schools and postsecondary institutions. The two factors which have contributed most to productivity gains in the United States are new knowledge and increased education of the labor force. Economic productivity in the United States will be impeded if these sources of productivity are not strengthened. We see alarming signs of the inadequacy of our educational system to meet the new demand -- the shortage of persons trained in math, science, engineering and computer technology; the decrease in student acquisition of higher-order intellectual skills; teacher shortages in math, science, engineering and computer sciences; the decline in the quality of the educational work force and reduced resources and support for education."

"The primary resource of the world of the future will be information and the ability to access and use information for the benefit of people. New information technologies provide the means to rebuild the industrial base of our society. The necessary raw material for using the technologies is the educated human mind. If any society is to survive in the future, it must prepare a large supply of this critical resource, human capital, in order to develop, use and apply the new technology."

"The improvement of formal and informal education and training is in the self-interest of all sectors of our society

and it will require collaboration among parents, the business community, politicians, educators and the larger society heretofore not seen."

THE ISSUES AND THEIR IMPLICATIONS

ISSUES

The application of information technology will change teachers' roles and hence the type of preparation they should receive.

IMPLICATION

The broad range of information technology available currently and that which is on the horizon will, with certainty, present education a broad range of differentiated roles to fill.

Expert opinion holds that information technologies will not replace teachers but they will change how we prepare them and what they will do in the classroom. During the past, our view of the teacher was that of subject matter expert, lecturer and information lister. The new information society will see the teacher as information user, diagnostician, resources linker, synthesizer of information, knowledge facilitator and evaluator. Other adults connected with the school will provide clerical services, storage and retrieval services and help keep records of individual learners.

The shift to an information society demands a different type of teacher and a different type of teacher preparation program. We will need to identify those areas in which machines will never be able to supplant teachers, as well as those where they not only can but should, and then work out new task assignments which make

the best use of both teacher and technology. **The University System, the Regents, the State Board of Public Education and the Legislature must take steps immediately to plan, support and implement the necessary changes.**

ISSUE

Teachers must be prepared initially to utilize technology in their classroom and then re-educated constantly to utilize the changing technology as it becomes available.

IMPLICATION

Times have changed since the days when worn out equipment was handed down to the public schools and universities for training purposes. Today's information technologies require inservice teachers to be on the cutting edge of technological application, and in order to contribute to our education potential, teachers must be educated in the best classroom applications as each new technology becomes available.

It is imperative that the Board of Public Education, the Regents and the Legislature provide the leadership and opportunity for Montana to have technologically competent educators. The continuing professional development of educators (teachers, administrators and other auxillary personnel) must be supported by policy and resources.

ISSUE

Faculty, administrators and staff in teacher education institutions must be prepared to utilize the new technologies and to apply them in the teacher education training of teachers..

IMPLICATION

Presently public schools, through block grant monies, have jumped ahead of the teacher training institutions in hardware acquisition. In addition, monies for inservice training in the use of technologies has also been available through the same sources. While manufacturers initially provide a basic introduction to the use of their wares, such a brief orientation does not carry with it the skills of application necessary to fully capitilize on the educational potential of technology. The hard reality is that technological relevance requires teacher educators to provide skills that they do not possess themselves. **The Board of Regents in concert with the Legislature must provide adequate funding for state of the art hardware and preparation of teachers of teachers.**

ISSUE

Teacher education must, if we are to have a technologically advanced society, attract in sufficient numbers and be able to educate with the latest technologies, a cadre of education personnel.

IMPLICATION

Montana's priorities and resources must be committed to build such a program. We are currently experiencing a teacher shortage in a number of critical subject areas. The baby "boomlet" (children of the postwar baby "boom") are starting to reach elementary schools.

The current teaching force is "greying" while interest in becoming a teacher is down 30-50% from a decade ago (depending on the region of the country). In Montana it is estimated to be

down 30%.

Finally, the academic ability of those currently entering teacher education has declined. This is primarily due to the increased professional opportunities available to women and the attraction of bright graduates to higher paying careers in the private sector. **The Legislature must provide the resources, and incentives to attract bright students to education. The Board of Regents must provide policy that enhances and upgrades schools, colleges and departments of education and the Board of Public Education must direct the teaching preparation programs to develop curriculum that assures each teacher will be trained to fully utilize educational technology in their classrooms.**

In addition, the citizens of Montana and their leaders must increasingly recognize and value the important contribution of educators to their well being. It is their children that must be encouraged to enter and remain in the teaching profession. In addition, the condition must not persist that it is more financially rewarding and psychologically satisfying to leave education than to remain a part of it.

ISSUE

Teacher education within the University system structure must be accorded a status and resource base that will provide leadership in preparing education personnel for the information technology world of the future.

IMPLICATION

The Resource base of teacher education programs in Montana is inadequate for the magnitude of the job to be done. A

national study by Bruce A. Peseau, The Fifth Annual Academic Production and Funding Study of Teacher Education Programs in Senior State Universities and Land-Grant Colleges, 1981-82, reveals that teacher education students are funded well below that which is provided for a public school pupil. He states from his statistics, "The dollar spent per undergraduate Teacher Education student was only 68% as much as for the average public school student."

In general, the budgets of schools, colleges and departments of education reflect lower faculty salaries, lower capitol monies, lower operation budgets and, thus, lower prestige than the average of the other colleges and departments. The emerging demands on teacher education programs will require a substantive increase in resources if they are to be successful. **It is imperative that all university administrators recognize and acknowledge the critical role that teacher education plays in the university setting as well as the economic and social fabric of our society. This recognition and support must be demonstrated through appropriate policy implementation, reward structures and fiscal support.**

ISSUE

"The switch to knowledge work as the economy's growth area and the large scale movement to new technologies means above all that productivity will increasingly be determined by the knowledge and skill workers put into their task."

IMPLICATION

The above quote by Peter F. Drucker in the Wall Street

Journal's Editorial Page, Tuesday, July 19, 1983, could well be the forward to the Build Montana Program. Recognition of the place of education and its institutions in the future well being of our State places a special burden and opportunity on our education institutions. Citizens of Montana have a right to expect their education institutions to provide the educational programs that serve the economic needs of society. **The Governor of Montana and his agents have an obligation to fully utilize the education system in this plan to build our state. The private sector likewise has a responsibility to contribute its resources to the education community for the common good.**

ISSUE

As our state is propelled into the era of high technology, the human needs of our citizenry, as affected by technology, must be safeguarded.

IMPLICATION

The ethos of Montanans holds a high regard for the needs of individuals. A balance must be safeguarded between the phenomenon of "high tech-high touch."

Most authorities agree that although technology will greatly alter the educational system, electronic devices will not replace the human element within those structures. Education personnel, to an extent even greater than in the past, will play the key role in the education of our citizenry. Indeed the schools may be the most crucial element in maintaining the human touch needed to assure each individual that they have a place in the world of high technology.

New roles for education personnel will demand a new type of

institutioonal ethic. A "high-tech" society will require state and federal policy which includes provision for maintaining human dignity and worth. This is a state responsibility augmented by a federal interest and responsibility. Both the state and federal governments must supply the fiscal support for the education programs they desire. There can be no concern without support.

ISSUE

If public education in Montana is to adapt to the rapidly changing social, political and economic realities of an information society, a network of stake-holders in the education process must provide the structure, coordination and resources for a future oriented education program.

IMPLICATION

The demands of the emerging information society will call for a cooperative effort within the state of a magnitude that has not been demonstrated in the past. The Board of Education, in concert with the Education Committees of the Legislature, must shoulder the mantle of leadership if we are to take advantage of the new information technologies in advancing the welfare of the State of Montana through its educational institutions.

ISSUE

Rural Education in Montana is a reality and will likely remain so! Unfortunately, to date, rural communities have not benefited from the technology that could provide the resources they need to compete with urban and suburban education units. All students and teachers, both preservice and inservice, must have equal access to information technologies as they affect public

education.

IMPLICATION

Mounting evidence points to the fact that the new information technologies are vital to the economic growth and development of the entire State of Montana, the region and the nation. **Responsibility for providing equitable resources to serve Montana citizens regardless of where they live rests with the Legislature, the Executive offices and duly constituted State Agencies. Public policy and state resources should recognize the special needs of rural Montana.** Montana educational policy and applications must reflect the impact of technology on the education provider. Students and educators denied equality of access will be societies new disadvantaged group. **Access to the hardware and software of information technology must be independent of the type of educational program, the size of the education unit, the geographical location of the unit or the fiscal resources of the education provider.**

ISSUE

To a large extent the future of Montana is tied to the future of the region. This is true not only economically but also educationally.

IMPLICATION

As we move toward a global society, Montanans are greatly affected by what happens in the Rocky Mountain region, the nation and the world.

We must establish reciprocity within the region and nation. Not only do we hire education personnel from outside our state, we also supply educators to other states. **Thus, to the extent**

possible, we should strive for reciprocity in teacher program accreditation, professional certification and recertification. The State Board of Public Education, through its policy, and the Office of Public Instruction, through its structure and practice, must reflect this interdependence.

CONCLUSION

The purpose of this Issues Paper is to call attention to critical needs attendent with the emerging information technologies society, and to focus the attention of Montana's leaders on the education system. Although, in this paper, we focus primarily on public schools and teacher education programs in the university system, it should be apparent that the issues both directly and indirectly involve others with vested education interests, including the citizens of our state.

Information and background for the paper grew from attendance at the SLATE Conference (State Leadership Assistance for Technology in Education) held in Helena, Montana, June 23-24, 1983, and the PEER Conference (Productivity = Efficiency x Effectiveness x Relevancy) held at Snowmass, Colorado, July 27-30, 1983, as well as from each individual author's search of current literature.

Rather than prepare a scholarly paper full of figures, footnotes, tables and citations, the authors have chosen to prepare a concise set of statements designed to stimulate reflection upon and discussion of the issues and their implications by leaders in the state.